VDOT Virginia Department of Transportation

Transportation and Mobility Planning

VTM Connection

Virginia's Transportation Modeling Newsletter

Modeling Track at Virginia GIS Conference is Well Received

About 400 attendees from Virginia as well as from other states came to Virginia Beach to attend the 2007 VA GIS Conference (picture provided by HRPDC)

VDOT and the Hampton Roads Planning District Commission (HRPDC) worked together to host the first ever travel demand modeling track at the 2007 Virginia GIS Conference which took place on September 24th-25th in Virginia Beach. About 30 people attended the modeling track from a broad variety of agencies and backgrounds. The modeling track featured five presentations and was moderated by Andy Pickard of HRPDC.

The first presentation titled: "Travel Demand Modeling in Virginia" was done by Paul Agnello of VDOT and gave an overview of travel demand modeling and describing current modeling activities in Virginia. The second presentation was titled: "Using GIS to enhance the Travel Demand Modeling Process" and was given by Paul Agnello and Matt Merrill of VDOT. This presentation focused on some potential ways that GIS can be used to enhance the travel demand modeling process and described some of the initial work that has been done in the Richmond/Tri-Cities and Charlottesville areas.

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Key Travel Modeling Websites

➲ **VDOT Travel Modeling**
(Available for VDOT intranet users only)
http://insidevdot/sites/Transportation_and_MobilityPlanningDivision/TravelDemandModelingProgram/default.aspx

➲ **Hampton Roads PDC Travel Modeling**
http://www.hrpdc.org/transport/travdemand.shtml

➲ **Metropolitan Washington COG Travel Modeling**
http://www.mwcog.org/transportation/activities/models/

➲ **FHWA Travel Model Improvement Program (TMIP)**
http://tmip.fhwa.dot.gov/

VTM SPOTLIGHT

ANDY PICKARD, P.E.

Senior Transportation Engineer, Hampton Roads Planning District Commission

Andy Pickard was born and raised in Schaumburg, Illinois, a northwest suburb of Chicago, and earned his undergraduate degree from the University of Illinois at Urbana-Champaign and majored in Industrial Engineering. After a brief period working on environmental impact statements at Argonne National Laboratory, he decided to return to school and get a master's degree in transportation planning. While a graduate student at Georgia Tech in Atlanta, Andy first developed an interest in travel demand modeling working as an intern for the Atlanta Regional Commission (ARC). After obtaining his master's degree in civil engineering, Andy joined the Hampton Roads Planning District Commission (HRPDC) where he has worked for ten years.

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The third presentation was titled: "National Household Travel Survey (NHTS) Background and Plans for 2008 and was given by Nanda Srinivasan of Cambridge Systematics (FHWA consultant). This presentation discussed the NHTS Add-On program both nationally and in Virginia. The fourth presentation was given by Ken Kaltenbach and Amandeep Randhawa of the Corradino Group (VDOT consultants) and discussed the HOV and Toll modeling work they will be doing for the Hampton Roads, Richmond/Tri-Cities, and Fredericksburg models. These projects are scheduled to be completed during the latter half of 2008. Lastly, Andy Pickard of HRPDC gave a presentation about the ability of the existing Hampton Roads model to predict travel patterns as the result of the temporary road closing. The analysis looked at the impact of the 2-month closing of the Midtown Tunnel in 2003 due to Hurricane Isabel.

VDOT hopes to help put on a similar modeling track at next year's Virginia GIS conference, which will be held in Roanoke.

FTA New Starts Modeling Workshop

By *Jeremy Raw*, AICP, VDOT Central Office

The Federal Transit Administration (FTA) sponsored their second workshop on New Starts modeling requirements in St. Louis, Missouri, September 19-20, 2007. Most of the 100 participants were travel demand modeling consultants and staff from sponsoring agencies. Jeremy Raw attended from VDOT.

The workshop presented the latest technical modeling requirements and recommendations for transit project grant applications under FTA's New Start (more than $250 million) and Small Start ($50 to $250 million) programs. The workshop reviewed SAFETEA-LU requirements impacting New Starts modeling as well as related FTA guidance. The workshop also explored general advances in modeling practice.

Air Quality conformity analysis, which is the primary application for urban travel demand models in Virginia, aims to visualize travel demand as it evolves over time in response to demographic changes and transportation system improvements. However, New Starts modeling is very specifically focused on quantifying "user benefits" (primarily time and cost savings) that are directly attributable to the proposed project. The primary quantity extracted from the travel model is a summary index of user benefit, which is computed from mode choice results using FTA's Summit software. One significant difference from Air Quality models is that New Starts models must use the same trip tables in all alternatives (ignoring feedback that might change the trip distribution based on altered congestion due to the alternative). FTA also recommends that New Starts model analyses explore whether they could presume that highway congestion is insensitive to the transit alternatives, which can simplify and streamline model application.

The workshop included many presentations from consultants and technical staff at sponsoring agencies who have developed New Start models. The key lesson from these presentations is that there is no one "correct" modeling strategy – the goal of New Start modeling is to start with clear modeling assumptions that are plausible and then to use these assumptions to demonstrate that claims made for project benefits are reasonable. The workshop emphasized the importance of sound input data and explored techniques for collecting good data, and proposed innovative techniques for improving data quality by combining results from different types of surveys.

NEWS BRIEFS

- Jaesup Lee joined the modeling group in VDOT Transportation and Mobility Planning Division in September and is a Georgia Tech graduate. Jeasup will be working with the models for Hampton Roads, Richmond/Tri-Cities and Danville.
- NHTS Add-On surveys are planned for Virginia starting in April 2008. More details on this process will be forthcoming in the next edition of *VTM Connection*.
- Citilabs CUBE 5.0 has been released: The final testing is going to be completed and a commercial release is expected in late Oct 2007.

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Presenters also called attention to many pitfalls in transit modeling, such as poor evaluation of terminal times due to the need to walk across a large park-and-ride lot to a transit station. Presenters also noted that some expensive activities, such as re-estimating mode choice model coefficients from household surveys, are routinely performed as part of New Starts modeling. But in practice, there is little variation in these coefficients, and it often makes more sense to focus one's effort on collecting more good data regarding transit ridership patterns and demographics.

FTA has been keeping track of model performance for some time, and has reported on the "success" of models in predicting actual ridership. New Starts projects must include "Before and After" modeling studies – the "Before" study is performed as the project moves into preliminary engineering, while the "After" study is performed with the same model once the project has been completed and is fully operational. FTA requires that the Before study quantify the anticipated uncertainty of the forecasts by setting "high" and "low" limits on the variation from the central forecast. The variation must reflect known limitations in input data, model sensitivity and model structure. Penalties may be assessed against the project (and the consultant preparing the forecasts) if the "After" forecasts are outside the anticipated range of uncertainty.

FTA has developed a free sketch model based on 2000 CTPP data that permits aggregate estimates of project benefits. The CTPP model can be used early on to help develop a plausible case to support the New Start application, prior to investing a lot of money in collecting data and doing detailed modeling. FTA is also developing guidance for claiming "off model" benefits in particular modes (such as an economic growth outcome, or the desirability of a comfortable commuter service with wireless internet access).

Overall, the workshop presented a very compelling vision of how travel demand models can be made transparent and credible using existing modeling technologies. The FTA New Start program has been a leading force in the advancement of the state of practice in travel demand modeling. Many of the lessons learned will be of great benefit throughout the travel modeling profession, in developing credible models, and evaluating model performance.

Additional information on the FTA New Starts program requirements:
http://www.fta.dot.gov/planning/planning_environment_5221.html

New Starts modeling technical guidance:
http://www.fta.dot.gov/planning/newstarts/planning_environment_219.html

Presentations from the September 2007 workshop:
http://www.fta.dot.gov/planning/newstarts/planning_environment_7275.html

VTM Member Profile - Hampton Roads Planning District Commission

The Hampton Roads Planning District Commission (HRPDC) serves as the MPO for the Hampton Roads region of Virginia, home to over 1.6 million people. HRPDC's Executive Director is Arthur Collins. HRPDC has over forty staff, with work being done in the areas of transportation (includes emergency management planning), physical and environmental planning, and economics (includes housing and human services). The HRPDC is also currently serving as the staff for the newly created Hampton Roads Transportation Authority, charged with managing the funding for six major regional projects totaling almost nine billion dollars.

The transportation department is headed by Dwight Farmer and has fifteen employees. Below are some of the department's recent reports:

VTM Spotlight *(continued)*

Andy is a senior transportation engineer and is responsible for helping coordinate the MPO Long Range Plan (LRP) process, performing technical analysis for the LRP including modeling and project prioritization. Andy also enjoys working on bicycle and pedestrian issues and is on the board of Bike Walk Virginia.

Andy is very interested in Census Data applications for transportation planning and helped write a report titled: "A Review of 2000 Census Commute Data for Hampton Roads" based on data from the 2000 Census Transportation Planning Package (CTPP) that is available on the HRPDC website. Andy has also recently become a member of the AASHTO SCOP Census Work Group, which discusses a range of issues relating to CTPP, PUMS, and NHTS data as well as Census Geography and TAZ definition.

Andy's hobbies include running, bicycling, beach volleyball, going to the beach, and music (highly recommends seeing the band Wilco live if you get the chance). Andy also enjoys traveling and spent a summer working in the Industrial Economics department of the Tampere University of Technology in Finland. Andy, his wife Tracey, and two-year old son Beck live in the City of Chesapeake.

News Briefs *(continued)*

- 2010 TAZ Definition: The Federal TAZ-up process for MPOs and states to redefine their TAZs using 2010 census geography is scheduled to begin in January, 2009.
- An article that introduces the Congestion Ranking Model made the front page of Sept 14 edition of The Urban Transportation Monitor. This model, which was developed by VDOT NOVA district, is able to help communities prioritize their transportation improvements.

- "Hampton Roads 2030 Long-Range Transportation Plan"
- A series of five reports on improving the mobility of non-drivers
- "Hampton Roads Transportation Participation Plan"
- "Naval Station Norfolk Traffic Study"
- "Suffolk Rail Impact Study"
- "Intermodal Management System: Regional Freight Study"
- "Hampton Roads Regional Travel Time Analysis"

Rob Case, Andy Pickard, and Dale Stith each work with the travel demand forecasting (tdf) model. Three current model projects include forecasting volumes and estimating origin-destination data for the Oyster Point area of Newport News, support for a study of major regional bridges, and the development of a tdf model for Franklin, VA to support rural long-range planning efforts. The model is also used for answering a variety of day-to-day questions about the region's transportation system. Over the past ten years, the model has evolved from having two separate networks for the region (separated by the James River/ Hampton Roads harbor) into a single regional network. The model has also been translated from a MINUTP script to its current TP+ script. It will soon be in Cube Catalog format as well, greatly facilitating the understanding of the model procedures, by allowing the user to view and use the model scripts through a flow-chart format.

New Town of Leesburg Model Completed

By *Bahram Jamei*, PE, VDOT NOVA District

The Town of Leesburg finished developing its first travel demand model this past summer. On August 15th and 16th, the Town of Leesburg provided training on their Travel Demand Model to their staff and interested county and VDOT modeling staff. The model was developed by Kimley-Horn and Associates, Inc. and the project managers were R. John Martin, P.E. and Erin M. Murphy, EIT (PA). The technical aspect of the model was developed by Craig Gresham, P.E., AICP. The model is window-based and includes Town of Leesburg and surrounding portions of Loudoun County (Greater Leesburg). It includes 58 square miles compared to 571 square miles to Loudoun County land area. The total population within the model is 35,000 people (2006) compared to 272,000 for Loudoun County (2007 estimate). The model was developed in the Cube/Voyager platform and is based on Version 2.2 of the regional Metropolitan Washington Council of Governments (MWCOG) Travel Forecasting Model with some modifications. It includes 196 Traffic Analysis Zones (TAZs) compared to 17 TAZs in the MWCOG model for the same area.

The model utilizes a traditional four-step process. It forecasts average weekday travel conditions and AM Peak Period (6-9), PM Peak Period (4-7), and Off-Peak Period (9 AM to 4 PM, 7 PM to 6 AM) traffic are produced as part of the model output. Trip generation is a cross-classification trip production process and trip attraction is based on regression process. There are seven trip purposes: HBW, HBSH, HBO, NHB, commercial vehicles (Auto, Medium and Heavy Trucks), external -internal (Auto, Medium and Heavy Trucks), and external-external (Auto, Medium and Heavy Trucks). Gravity model is used for trip distribution. The mode split accounts for non-auto trips but it is not a logit choice model. Non-auto trips are not assigned. Auto occupancy is separate by purpose (not a single factor). Mode splits factors are developed for HBW, HBSH, HBO, and NHB. Trucks are treated as separate trip purposes. Finally, trip assignments for auto and truck vehicle trips are performed using a combination of equilibrium and all-or-nothing assignments with 25 iterations. No speed feedback is involved.

Some other features of the model include roadway capacities which are based on facility type, number of lanes, median type, parking, and narrow lanes. Also, volume-delay functions based on facility type are used in the model.

Highlights of Virginia Travel Demand Modeling Activities

No.	Region	Contact(s)	Current/Recent News
1	Washington, DC	Bahram Jamei	The new Version 2.2 model will be released by January 2008.
2	Northern Virginia	Bill Mann	New Leesburg model has been developed.
3	Hampton Roads	Jeremy Raw Andy Pickard	Model was used in Oyster Point Traffic Management Study (provided volume forecasts and o/d data), forecast of volumes for thoroughfares in the region (over 1,300 road segments) and air quality conformity analysis. It is being enhanced for the purpose of adding toll capabilities. Development of model for Franklin.
4	Richmond/Tri-Cities	Jeremy Raw	Model is being prepared for Long Range Plan. Tri-Cities MPO used model to perform travel demand forecasts for the Fort Lee BRAC Growth Study.
5	Fredericksburg	Nelson Newton	Model has been revalidated and is being used for Long Range Plan.
6	Charlottesville	Juyin Chen	Model is being updated and new transit component will be added.